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ScienceDirect

Procedia Social and Behavioral Sciences 15 (2011) 33–36

Procedia Social and Behavioral Sciences

WCES-2011

Prospective secondary mathematics teachers' opinions about electronic geometry textbook: e-geo and its usage

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Abstract

This study was made in order to present the views of prospective secondary mathematics teachers about e-Geo, an electronic textbook developed by them. Thirty-six prospective teachers who have developed and evaluated their works were the participants of this qualitative inquiry. Data gathered were carefully analysed and thematised to determine perspectives related to the material. Findings gathered during and after the implementation of e-Geo activities show that they developed a positive evaluation appraisal. Prospective teachers remarked that they went by the mathematics curriculum and associated the activities with every day maths during e-Geo development process.

*Keywords:*Elektronic textbook, geometry,e-Geos, prospective teachers;

1. Introduction

Elemantary education is essential for concept learning and developing skills. In this regard, textbooks are a sine qua non for this process. The main goal of mathematics instruction is to encourage students to engage in activities related to every day mathematics. Materials used for instructional content are criticial to reach the stated goal.

As is known, textbooks are generally used as printed versions. But thanks to recent growth in internet usage, electronic books are as popular as they have ever been. An electronic textbook is therefore important for instruction and suggested as an alternative or basic material. Alongside electronic textbooks contain all of the features of their printed versions, they also have interactive interfaces which are good for promoting learning. Within the framework of copyright and access, they can be easily downloaded or transferred. But however, there are some cases not every student has a computer or internet, or some students may not know how to use a linked software.

There are few studies about using e-books as textbooks and generally cost, educational value and physical properties are the limitations made in these studies. Another limitation made is about shifting between teaching methods, especially web based education and computer aided instruction. So any problem related to integrating e-learning tools into lessons also takes the researchers to a choice: Support your lessons with these technologies or use only them. For instance, in a study referring to using electronic textbooks as "online teachers" within the context of web based education, Brusilovsky et al. (1998) has emphasized on availability of a series of electronic textbooks developed for concept teaching. Page visits, problem solutions and quiz answers have been used as data. Another

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doi:10.1016/j.sbspro.2011.03.045

cynosure of the data collecting procedure is that each student might have an individually assigned learning goal. Results show that electronic textbooks' guidance may make concept learning easier. It has been said that apart from factors related to instructional content, instructions and the site interface are also important for availability.

In a study about electronic textbook development, Railean (2007), investigated how electronic textbooks affect learning phases. Also Taylor (2005) claimed that a student having an understanding about a topic should also have the ability of explanation, interpretation and implementation. Both Taylor and Railean agreed about electronic textbook development criterions by emphasizing on these abilities. Railean (2007) also suggested an alternative electronic textbook in a pilot study. In the study students were asked what they know about the subject by concept maps before and after the electronic textbook application. At the end of the study, results show that electronic textbooks increases the average scores (%42) related to concept map designing ability.

Simon (2001) conducted a study about students' e-reading habits in order to determine the features students use the most in an electronic textbook. Researcher thinks that college classroom environment should be the target for experimental electronic textbook studies denoting college students typically embrace new technologies and also purchase a high volume of expensive, cumbersome and rapidly discarded books. In a three years time, the test population having a wide range of age and background variables, completed 20 surveys about their e-reading habits at the end of each semester. Findings show that students like glossary the most and they do not like taking notes on the electronic textbook. The other things they like after looking up in the glossary were underlining and highlighting in order. All the students gave positive answers about willingness to use an electronic textbook. Also eighty four percent of the students commented that they can purchase an electronic textbook at the beginning of next semester.

In a study about copyright, reading ease, institutional readiness and commercial readiness for developing an electronic textbook, Kropman et all (2004), determined student perceptions about the book with the downloading and online reading choices. At the beginning of the course students' perceptions about the e-book were determined balanced between difficult and easy. By the end of the course results showed that these perceptions had shifted, slightly, towards a reluctance to use another e-book. Researchers note that one third of the students expressed a keenness to be exposed to an e-book again while about 20% were neutral about that.

Bradshaw (2005) conducted a study about electronic textbook criterions by using ePsych, an electronic textbook developed for psychology lessons. The basic principles taken into account were learning from concrete experience, mastering complex networks of material, and strengthening memories through practice. Researcher pointed out that as students learn the basic concepts from concrete forms, they can be capable of constructing knowledge for more concrete phases of learning process. For this reason it is said that first and basic learning activities should be implemented by materials like ePsych.

This study was made in order to present the views of prospective secondary mathematics teachers about e-Geo, an electronic textbook developed by them.

2. Methodology

In this study, prospective secondary mathematics teachers' electronic textbook development experiences and their opinions about this application investigated by active research approach, a qualitative research method.

The population consisted of thirty six prospective mathematics teachers attending Eskişehir Osmangazi University, Faculty of Education. The sample selected from those who attend "Analysis of Secondary Education Textbooks" lesson.

This study was implemented within analysis of Secondary Education Textbooks and geometry learning area in the lesson content, structured research questions of active research and sample electronic textbook chapters prepared by prospective teachers.

3. Findings

Interviews made before e-Geo work show that prospective teachers were not familiar with electronic textbooks. Also, most of them did not take a bright view of using e-textbooks in mathematics lessons. After the e-Geo experience most of the participants denoted that electronic textbooks are good to encourage students to do research and make them more active in learning mathematics. They think electronic textbooks like e-Geo can help students

having difficulties in constructing 3-dimensional objects during geometry lessons, especially thanks to their educational software links and video display properties. But however, there were prospective teachers who pointed out the limitations an electronic textbook may have. They denoted that it may be harmful for eye health when activities made in a continuous process and some students may not have computer on their own and this may be a disadvantage for reviewing a lesson or doing homework. In the light of this information, two main themes that allowed estimation of the overall effects of the e-Geo application are presented below.

Opinions About the Development of e-Geo and Evaluation of the Instructional Content

Ayşe and Mustafa, evaluating other groups and their own work, put themselves in students' place and generally talked about the cases of use:

Ayşe: "Solutions to the problems are shown when we click on a link so it gives students an opportunity to think about the answer. While studying with a textbook, you can see the solution or answer of a question and i think this causes a disadvantage about instruction."

Mustafa: "I think as compared with the printed textbooks the main difference e-Geo has is its visual quality. Also links to various applications can make students picture a subject before activities."

Some of the participants emphasized on geometry topics and the properties of e-Geo developed for these topics. Also, most of the participants pointed out the need for an association with every day life and every day mathematics.

Elif: "It is useful because it has links to videos, sounds and also interactive games. Also students get over kilos of load. "

Ahmet: "I think we made tessellations and patterns sub learning area more clear than textbooks. We gave examples from every day life and it is different from those test-purpose books."

Esin: "E-Geo includes many different activities. We found examples from every day mathematics. I think students do not have difficulty in learning subjects associated with every day life."

Ayten: Through group works for development of e-Geo i aimed to design environments that students feel doing mathematics. We tried to associate topics with their past knowledge this is very important you know, when reviewing newly learned subjects. "

As it is understood from these four participants' opinions, they remember their own learning experiences and exams they had. Another participant, Ali pointed out the inside features of the e-Geo:

Ali: "Links like "*Click here for more information"* are challenging for students and they can learn how to learn by instructions related to a subject."

Aslı denoted that group work for development of e-Geo was a disadvantage for providing unity between the chapters. Kemal also pointed out this case:

Aslı: "I think the differences in explanation of each sub-learning area made negative influence on the book."

Kemal: "I think e-Geo is not suitable and it may be more suitable when we study more. But it is good for the newly changed mathematics curriculum and geometry topics."

Opinions About Availability of e-Geo As A Geometry Electronic Textbook

Simge: "I think it would be useful and very good for students but it should be supported by concrete materials."

Erkan: "I find it important to use visual quality in a lesson and i think e-Geo is a source that students would like more than textbooks. But we should not forget that not every student has a computer in his or her home."

As seen above, Simge evaluated e-Geo as a material within the context of computer aided instruction. Didem and Ali think learning from the materials like e-Geo may be fun for students as most of them like computers:

Didem: "Students like computers very much so e-Geo has this advantage."

Ali: "The material we developed is a source the students of this technology age should have. Students prefer learning from computers to learning from books."

The limited features of printed textbooks causes a need for more technological materials. Mustafa found e-Geo very important for instruction because before this experience, he knew e-books as novels he can download from internet so when he understood the educational value of computer supported materials his beliefs have changed. Materials having interactive interface properties are essential for instruction, especially in areas requiring 3-dimensional modelling like geometry. Two prospective teachers emphasized on these cases:

Hale: "Students can unfold a pyramide or they can see every step of its construction."

Leyla: "Its fun and also teachers can demonstrate a geometric object easier than those examples on the book or on the blackboard."

4. Conclusion

The results of the study show that prospective teachers thinks e-Geo was successful wherefore the activities were prepared with respect to the mathematics curriculum and every day mathematics. They also think hypermedia used in these activities make content more clear for students having difficulties in constructing geometric objects. To them, links to several useful geometry softwares (Poly, GSP etc.) would provide students to test their knowledge about two and three dimensional objects. By courtesy of their e-Geo experience, prospective teachers had considerable positive thoughts about electronic textbook in comparison with their past beliefs. They think e-Geo is good to make students pay attention to the lesson, whet their curiosity and encourage them to search out. After all, some prospective teachers point out it may be harmful for eyes because in some cases electronic textbooks requires permanent computer usage. Again, all students may not have a computer and this was revived as a disadvantage by prospective teachers. In a word, prospective teachers are more likely to be familiar with the instructional content and they are willing to apply it with technology but they feel a bit incompetent about technical aspects.

Prospective teachers learn the principles of student centered education approach in their lessons and owing to the various classroom activities, they are the first “operators” of this approach indeed. For that reason it is thought that they are important because they develop and evaluate e-Geo. At the same time they may not represent some shortcomings wherefore they evaluate their own work. For future research, teachers and students may be interviewed about e-Geo. Also, e-Geo’s efficiency on students or their attainment level to electronic textbooks may be another study related to stated research.

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